UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE NOVEMBER/DECEMBER 2006

Edging Extinction

Can vanishing amphibian species be saved?

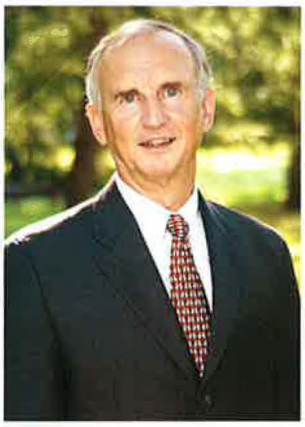
Elephants in Antarctica

Righting Initiation Wrongs

Following Nemo

Stress and Binge Eating

President's Message



THIS ISSUE OF *UMAINE TODAY* features several stories about University of Maine faculty and student researchers whose work has international implications. Good examples of the worldwide reach of UMaine expertise are Brenda Hall's groundbreaking research in Antarctica, Joyce Longcore's prominent role in the international effort to solve the puzzle of widespread amphibian die-offs and Louis Fortin's contributions to new archaeological discoveries in Peru

UMaine's strong academic programs with international affairs components are a powerful draw for the significant number of students who are interested in those disciplines. Our students have opportunities to study and intern abroad, and to interact with international members of our university community in Maine.

Our students also benefit from service learning activities that support their studies and provide the opportunity to help improve the lives of others. Professor of Spanish Kathleen March is a leader in this area, working primarily in Honduras. Another great faculty example is Sheila Pechinski of the Maine Business School, who recently led a student group to Belize, where they worked through Sustainable Harvest International to help people with agriculture-based businesses to develop effective land-use practices.

Modern communications technology and other factors have dramatically changed the ways in which we interface with those in other countries. Because of the international stature of so many UMaine faculty members, our students have the opportunity to learn how to interact and communicate across time zones and cultures, preparing them for leadership roles in the worldwide society of the future.

Robert A. Kennedy
President

ON THE COVER: The mysterious aquatic fungus B. dendrobatidis is known as the "frog chytrid" because it inhabits the skin of amphibians and has been implicated in population declines worldwide. University of Maine mycologist Joyce Longcore has been studying chytrid fungi for decades. Indeed, she was one of the first to identify the frog chytrid after veterinary pathologists found that it was responsible for killing frogs in captivity and in the wild. Today in her laboratory, she maintains what is probably the most comprehensive collection of chytrid fungi in the world, including strains of the frog chytrid. She shares her cultures with scientists who are racing to find out how the frog fungus kills and spreads among populations.

Take the *UMaine Today* online readers' survey. Let us know what you think of the magazine. www.umainetoday.umaine.edu/index.html

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University of Maine profile

Located in Orono, Maine, the University of Maine is the state's land-grant and sea-grant institution. UMaine serves its home state through its explicit statewide teaching, research, and public service outreach mission. Offering 88 bachelor's, 64 master's and 25 doctoral degree programs, UMaine provides the most varied and advanced selection of programs available in Maine. The Carnegie Foundation for the Advancement of Teaching classifies UMaine as a Doctoral Research Extensive University, the highest classification.

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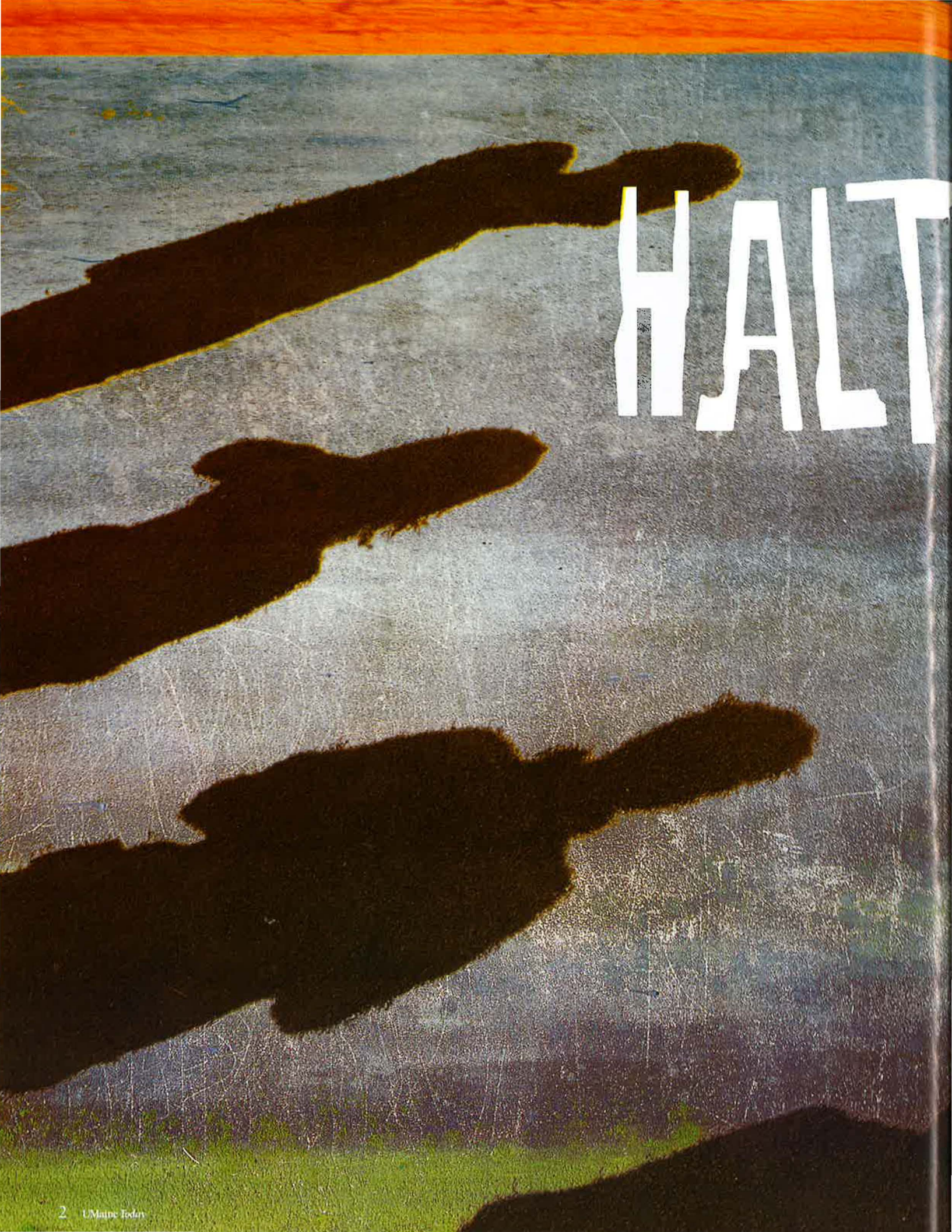
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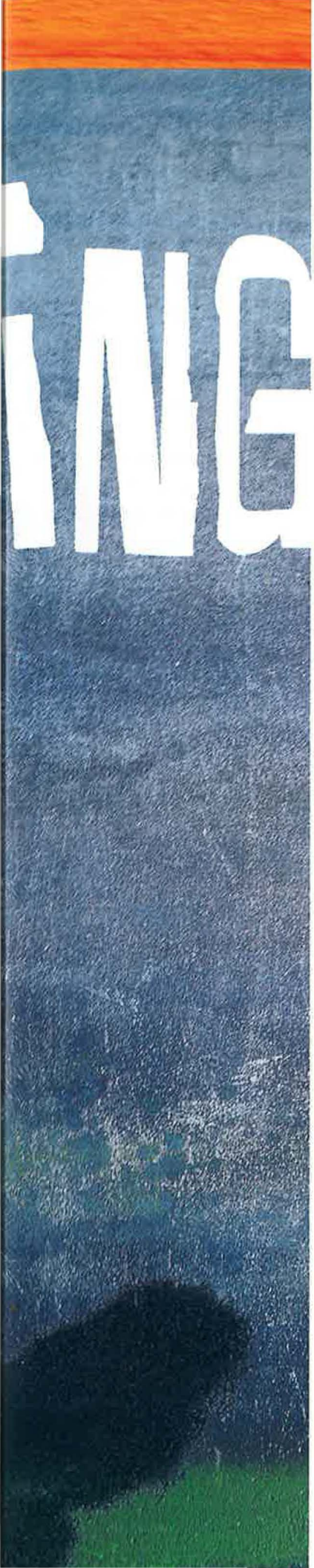

Groundbreaking study by two UMaine educators sheds new light on student initiation rituals in an effort to transform campus culture

HAZING

By Dick Broom
Illustration by Michael Mardosa

The initiation night seemingly started innocently enough.

It didn't end that way.

The inductees of the student organization were required to put on ridiculous costumes, a different one for each of them, picked out by veteran members. They then had to go to the campus dining hall to sing the university song. Next stop: an off-campus party, where they had to recite children's rhymes, suck their thumbs and perform sexual simulations. Forced to participate in drinking games, the new members quickly became falling-down drunk.

The humiliation and coercion ended only when the party was "busted" by authorities.

"As much as it was supposed to be (about) team building and camaraderie, they (the other members) weren't there for you at the end of the night," says one of the young women, who endured the hazing and had to call friends to get home.

THE WOMAN WAS ONE of 90 students and staff members at four northeastern post-secondary schools interviewed in spring 2005 as part of a pilot study for the multiyear initiative, "Examining and Transforming Campus Hazing Cultures," being conducted by two University of Maine education researchers. The study included an online survey completed by nearly 1,800 undergraduates at the four schools — a small, private college and three public universities.

Findings of the pilot study released earlier this year confirm that, despite policies against hazing at virtually every college and university in the country, the practice continues in student groups ranging from athletics teams and fraternities and sororities to theater groups and marching bands. One in 20 survey respondents said they had been hazed at their current college or university. However, four times as many reported that, in high school and college, they experienced hazing behaviors, defined as "any activity expected of someone joining or participating in a group that humiliates, degrades, abuses or endangers them, regardless of a person's willingness to participate."

The study is now a springboard for the first-ever nationwide research project being launched in January to study the prevalence and nature of hazing in colleges and universities. The national data will help colleges and secondary schools develop policies and programming to prevent hazing, according to the study's principal investigator, Elizabeth Allan, who has researched and written about the issue for the past decade.

HALTING HAZING

"Hazing is a complex social problem that can have damaging effects on students and campus communities," says Allan, associate professor of higher education at UMaine and a nationally recognized authority on hazing. "(The hope is that) empirical data generated from all phases of this national study will inform best practices related to the intervention and prevention of hazing."

DESPITE DOCUMENTED hazing incidents nationwide, including some that have ended in death, there has been little scholarly attention paid to the issue, according to Allan and the study's coauthor Mary Madden, both from the UMaine College of Education and Human Development. The most extensive data on hazing practices was compiled by Alfred University and the NCAA in a report, "Initiation Rites and Athletics: A National Survey of NCAA Sports Teams." Since the groundbreaking research in 1999, concern about the little-understood yet pervasive hazing culture and its consequences is growing, fueled by video and photographs posted on the Internet of young people allegedly involved in hazing incidents.

With release of the preliminary findings of the pilot study by UMaine researchers this past March, the North American Interfraternal Foundation (NIF) and the National Association of Student Personnel Administrators stepped up to sponsor the more comprehensive second phase, the national study. The two have since been joined by more than 20 other national organizations, including the NCAA.

The study is expected to provide "critical information regarding hazing on college campuses to help us understand the underlying cultural issues and to be proactive in dealing with the issue," according to NIF President David Coyne in a statement.

National media coverage of the findings by Allan and Madden coincided with a June 2 front-page story in *The Chronicle of Higher Education* about nearly a dozen colleges and universities that have launched investigations after photos posted online showed student athletes in alleged hazing rituals.

In a *USA Today* story about the compromising photos, Allan talked about the myths and realities of hazing. Allan said that alcohol is the intimidation instrument of choice in most hazing incidents. Once a male-dominated rite of passage, hazing today seems to involve more girls and women than ever before.

According to Allan, it appears that hazing is becoming more prevalent and its demeaning methods more severe.

"I think there are many factors that affect motivation to be a part of it, to go along with it," Allan told *USA Today* this past May. "Certainly we know that group peer pressure plays a major role. We know people want to be involved. It's a human need. Then you combine that with alcohol that is impairing judgment.

"The popular media and the normalization of these kinds of behaviors make it more likely that students will not question the appropriateness. There's a real culture of wanting to prove one's self — not just needing to belong, but to earn your status, that you are tough and can take it."

MANY OF THE hazing incidents that students reported in Allan and Madden's pilot study took the form of drinking games or coerced consumption of alcohol.

Respondents in the pilot study said they were deprived of sleep, forced to simulate sex acts and kept outside in harsh weather without proper clothing. Some reported violence and outright brutality.

Often, hazing doesn't risk physical or psychological harm, merely momentary embarrassment, such as being forced to sing or chant in public. But sometimes hazing leaves indelible scars.

"I didn't tell anyone the full extent. There are a lot of things you'd just rather forget," said one student who was interviewed.

"In many cases, those who are most vocal in promoting hazing are those who are bitter and angry about the hazing that they themselves endured (but don't admit this publicly) and expect that others should be abused in order to gain 'true' membership in the group."

Elizabeth Allan

On her Web site, StopHazing.org, Allan offers alternatives to hazing, including community service projects to foster unity; group activities like attending movies or plays to instill a sense of membership; participation in professionally supervised adventure and challenge activities, like ropes courses, to promote a sense of accomplishment.

"In many cases, those who are most vocal in promoting hazing are those who are bitter and angry about the hazing that they themselves endured (but don't admit this publicly) and expect that others should be abused in order to gain 'true' membership in the group," says Allan on her Web site. "You will also find that some of these folks are likely to be bullies of the group — people who enjoy a 'power trip' at the expense of someone else."

ALLAN NEVER THOUGHT much about hazing until 1990, when her job as a student life officer at the University of New Hampshire expanded to include oversight of fraternities and sororities.

"Students began reporting various incidents related to hazing," she says. "I had one young man who told me he had been paddled so violently the night before that he was urinating blood. It turned out he had kidney damage."

At about that time, Allan read the book *Broken Pledges: The Deadly Rite of Hazing* by Hank Nuwer. Between Nuwer's eye-opening account and students' stories about abuse and degradation, Allan says, "I realized that I could make a difference — and I needed to."

Allan led a successful lobbying campaign to get New Hampshire to enact an anti-hazing law. Today, it is one of 44 states with antihazing legislation on the books.

"Some legislators wanted to know why we needed a law," she recalls. "An actual quote from one of them was, 'It's just some students swallowing goldfish.' I still get that from a lot of people."

In the pilot study, one in five respondents reported being involved in a specific behavior that met the definitions of hazing, but did not consider themselves to have been hazed because "nothing happened to me that I did not agree to" or "it was all in fun."

The discrepancy points to students' perception that as long as they felt in control, it wasn't hazing, says Madden, an assistant research professor. They tended to identify hazing and its levels of seriousness more with physical components, such as being tied up or paddled, rather than with coercion or peer pressure.

"We heard that from a number of students," Allan says. "It was a sort of reframing of the event so that they didn't have to admit they weren't in control of the situation. And they were emphatic about it.

"One predominant fear was that, if they said no, they wouldn't be accepted by the group," Allan says. "Another fear was there would be retribution, which has happened to students who reported hazing."

Previous studies have found that hazing is a factor — sometimes the main factor — in both declining academic performance and school dropouts. It also isn't confined to fraternities, sororities and athletic teams. It occurs in other collegiate and school organizations, as well as the military.

"This suggests that hazing is part of the culture of an entire institution, not just one or two groups," Madden says. "Changing that culture will require institutional resolve."

A GOAL OF THE national study is to arrive at a better understanding of the dynamics of hazing among college students and to suggest research-based strategies to prevent the harm many students report experiencing due to hazing.

The researchers are eager to see if the national study confirms several intriguing findings of the pilot project. For example, 40 percent of students who reported being involved in hazing said that a coach or organization adviser was aware of the hazing. Twenty-two percent said the coach or adviser actually participated in the hazing.

For the national hazing study, Allan and Madden hope to survey up to 100 colleges and universities, and conduct interviews at a number of these institutions. They want to include schools in every region of the country — large and small, public and private, urban and small town, and racially diverse.

Allan and Madden also hope the study will offer more insight into the fundamental question of why hazing exists and persists.

"If you look at it through an anthropological lens, you might see hazing as a rite of passage," Allan says. "A child, adolescent and adult development lens would give you another view. The same is true of a sociological lens. I think we need to apply all of these lenses to really understand hazing." ▮

Is it hazing?

WHEN THE NATIONAL media want to talk to an expert on hazing, they are likely to call Elizabeth Allan at the University of Maine.

Allan has been interviewed by magazines as diverse as *Sports Illustrated, Teen People, Glamour, Good Housekeeping, Rolling Stone* and *Congressional Quarterly.* A 2004 Public Broadcasting System documentary on hazing, *Unless a Death Occurs,* featured an interview with her.

The Web site Allan cofounded, StopHazing.org, attracts thousands of visitors each month.

One of the many myths about hazing, Allan says, is that it is often hard to tell whether an activity is hazing or just innocent fun. To distinguish, she says, use common sense and ask the following questions:

Is alcohol involved?

Will current members of the group refuse to do exactly what the new members are being asked to do?

Does the activity risk emotional or physical abuse?

Is there a risk of injury or a question of safety?

Do you have any reservation about describing the activity to your parents, a professor or school official?

Would you object to the activity being photographed for the school newspaper or filmed by the local TV news crew?

If the answer to any of these questions is yes, says Allan, the activity is probably hazing.

Checklist adapted from a Sigma Alpha Epsilon fraternity policy on hazing.

CATEGORIES OF HAZING

Subtle hazing — Behaviors that emphasize a power imbalance between new members/rookies and others in the group. Activities accepted as "harmless," but show lack of mutual respect. Examples: deception, lineups and drills, demerits.

Harassment hazing — Behaviors that cause emotional or physical discomfort. Harassment hazing confuses, frustrates and causes undue stress for new members/rookies. Examples: threats, crude stunts, sleep deprivation.

Violent hazing — Behaviors that have the potential to cause physical and/or emotional, or psychological harm. Examples: forced or coerced alcohol or other drug consumption, beatings, branding, public nudity, abduction.

Excerpted from StopHazing.org

Inner Strength

advanced engineered wood composites

Technology used to develop hybrid wood and nonwood composite building material is at the heart of the University of Maine's Advanced Engineered Wood Composites (AEWC) Center. It all started with fiber-reinforced polymer (FRP) timbers, right. Today, the center is a world leader in the development of low-cost, high-performance composites of wood and wood by-products, natural and synthetic fibers, concrete and plastics that can be used in new products.

Patent-pending delta strand lumber developed at AEWC uses pulpwood-grade sticks to create lumber suitable for structural framing. The composite is two to three times stronger than solid wood.

More information about AEWC and its products is on the Web (www.aewc.umaine.edu).

In Maine from 1991–98, AEWC used fiber-reinforced polymer (FRP) wood composites to construct more than 20 demonstration bridges, ranging from 22 to 192 feet long. AEWC engineers also developed the world's longest engineered wood pier built with FRP panels, designed and fabricated on campus. The panel system delivers strength equal to concrete, but weighs 66 percent less. Civil engineering graduate student Melanie Bragdon oversaw the construction of the 167-foot Milbridge Pier, above, which opened in 2001. The pier was named America's best timber bridge in 2006 by the American Institute of Timber Construction — The Engineered Wood Association, the U.S. Forest Service and *Roads & Bridges Magazine*.

The center is an international leader in biopolymer extrusion. This process combines fibers from sawdust or other materials (i.e. rice, flax, recycled tires) with plastics (i.e. polypropylene from recycled soda bottles) to produce the next generation of construction materials. Currently, AEWC is working with the U.S. Coast Guard to develop structural biopolymer composites that are superior in a corrosive marine environment.

One of AEWC's eight patents is for an FRP composite panel, specifically designed to withstand hurricane-force winds better than conventional building materials. Currently, 15 other AEWC patents are pending.

Composite roof systems combining framing, insulation and sheathing into a single product have the potential to be used in residential construction. The panels have been used on campus in the construction of the Child Study Center addition and the Student Innovation Center.

The U.S. Army is working in partnership with AEWC to develop a Modular Ballistic Protection System, employing lightweight composite panels that will provide troops in a tent camp environment with superior protection from mortar attacks. Two patents are pending.

Composite arches developed at AEWC can be inflated on site and filled with concrete to rapidly construct short-span bridges, hangers, tunnels and other structures. The arches are lightweight and easy to transport. Two patents are pending.

The U.S. Navy's high-speed Mark V Special Operations Craft could one day have advanced composite hulls developed by AEWC researchers to reduce shock and vibration problems now caused by the aluminum hulls. AEWC engineers are working with the Office of Naval Research and Hodgdon Yachts in East Boothbay, Maine. The research and development has already led to the creation of a new spin-off company, Maine Marine Manufacturing LLC, which infused an 83-foot-long carbon composite Mark V hull this past August.

U.S. Navy photo

ANCIENT ELEP

Prehistoric remains of the southern seal species shed new light on climate change thousands of years ago

SOUTHERN ELEPHANT SEALS that grow up to 20 feet long and weigh in at 4 tons aren't creatures you search for armed only with digging spoons and tweezers. But, then again, elephant seals weren't really what University of Maine glacial geologist Brenda Hall had set out to find.

In 1994, Hall and her scientific team were conducting research in Antarctica that they hoped would lead to better understanding of how the world's climate has changed over time. By comparing ancient beaches that were created by the slow retreat of glaciers throughout thousands of years, they compiled information about sea level and glacial movement along the windswept coastline of the Ross Sea in Antarctica.

Combing the barren landscape for tiny particles of organic matter, they hoped to find something large enough to allow for accurate carbon dating of the ancient shoreline.

What they found were elephant seals.

In Antarctica, University of Maine glacial geologist Brenda Hall, right, and her scientific team unearth skeletal remains of southern elephant seals, a species that no longer inhabits the ice-locked coast of the Ross Sea. Carbon dating of the remains has revealed that the area may have experienced a warming period between 2,300 and 1,100 years ago. The findings shed new light on the stability of the Antarctic ice shelves. Today, elephant seals are found in the warmer waters north of the Ross Sea, breeding on subantarctic islands. The largest population is in South Georgia.

Antarctica photos courtesy of Brenda Hall and Audrey Bamberg

HANTS
IN THE ANTARCTIC

By David Munson

Adult elephant seals spend most of their lives swimming the oceans in solitude, hauling out of the water only twice each year. Preferring quiet, isolated beaches, the seals spend more than two months on land, surviving on fat reserves built up over months of foraging beneath the waves.

Photo by Gerald and Buff Corsi ©California Academy of Sciences

ANCIENT ELEPHANTS IN THE ANTARCTIC

Elephant seal teeth discovered on the Ross Sea coast in Antarctica are studied in a lab at the University of Maine. In the 1960s, George Denton, a UMaine researcher and Brenda Hall's former graduate adviser, was among the first to discover elephant seal remains in Antarctica. Researchers now realize that some other elephant seal remains found on the continent were previously misidentified as Weddell seals, a much more common Antarctic species. The elephant seal, the largest seal on Earth, gets its name from the male's large, inflatable snout.

The tiny samples of skin and fur recovered from the first dig sites eventually led the researchers to much larger remains, including entire seal carcasses frozen and mummified by the southernmost continent's frigid winds. Tests showed some of the remains to be as much as 7,000 years old, but it was the location of the discovery that attracted the attention of biologists and climatologists alike.

"It took a while to identify what we had found. We didn't expect to find elephant seals because they don't live in the Ross Sea," says Hall. "Even foraging individuals are extremely rare that far south today, (yet) we had found evidence of a large population molting and breeding there as recently as 1,000 years ago. This is important to understanding climate conditions, because there has got to be a change in climate for the seals to have lived there."

ELEPHANT SEALS ARE picky when it comes to choosing sites to breed and molt, refusing to haul themselves out of the water unless the shoreline is completely clear of sea ice. Current conditions in the Ross Sea leave the seals' former breeding grounds choked with sea ice year round, relegating the current population of southern elephant seals to subantarctic locales farther north.

Hall and her colleagues published a paper in *The Proceedings of the National Academy of Sciences* in June that points to the seal remains as evidence for a warming period in the region, which they believe occurred between 2,300 and 1,100 years ago.

Important to more than just elephant seal researchers, Hall's findings shed new light on the stability of Antarctic ice shelves, according to longtime UMaine researcher George Denton.

"The critical question that she is helping to answer is: How stable are the huge southern Antarctic ice shelves? Ice shelves are what hold together Antarctica's two major ice sheets, and marine-based ice shelves like that found in the Ross Embayment have been disintegrating rapidly over the last decade," says Denton.

"If a big ice shelf were to give way, the results could be catastrophic. Through her discovery of elephant seal remains over a widespread area where they do not exist today, she shows evidence not only that a warming occurred, but that the Ross Ice Shelf survived that event. It's important because it speaks to the staying capacity of the ice shelf in the face of global warming."

Denton, an internationally recognized authority in Antarctic research and Hall's former faculty adviser at UMaine, was the first to discover elephant seal remains in the Antarctic while working with Robert Nichols of Tufts University as an undergraduate research

While it may seem a bit unusual for a geologist to be using seals to tell a story about climate change, stranger still is the fact that penguins seem to be backing it up.

assistant in 1958. Carbon dating showed the remains of the solitary animal to be more than 4,000 years old, but the find was lost among many other new discoveries in the early days of Antarctic research. Now more than 40 years later, the use of animal remains as clues to past changes in the environment is coming to the fore.

HALL IS THE FIRST TO ADMIT that she is no seal biologist, but she has become something of an expert on southern elephant seals since she plucked the first few flakes of frozen skin from the sand nearly 12 years ago. And while it may seem a bit unusual for a geologist to be using seals to tell a story about climate change, stranger still is the fact that penguins seem to be backing it up.

Hall is working closely with Carlo Baroni, a researcher from the University of Pisa in Italy and an expert in the status of past and present populations of Adelie penguins. Together, they are working to determine how data on ancient populations of southern elephant seals and penguins in the Ross Sea can be combined to create a more accurate picture of climate conditions in the region.

"What we have found is that when the penguins disappeared, the elephant seals began to arrive in full force. While no sea ice at all is good for elephant seals, it is bad for Adelie penguins," says Hall. "Combining the two species to look at sea ice patterns in the Ross Sea is helping us to get at what the climate has been like over time."

Hall's efforts in this and other projects have earned her no small amount of recognition, including her recent selection as a distinguished young scientist by the National Academy of Sciences (NAS). Selected by a committee of NAS members, Hall and other future science leaders will be attending the NAS Kavli Frontiers of Sciences Symposium in November to build a collaborative network to address some of the most pressing questions in science.

With a recent National Science Foundation grant, Hall also will be part of a three-pronged effort to strengthen the team's initial findings regarding the Ross Sea elephant seals. While Hall seeks to answer questions regarding the age of elephant seal colonies on Victoria's Land and to look for clues regarding where the populations may have gone, another group from the University of California - Santa Cruz will be using stable isotopes to determine foraging patterns for the ancient colonies. And researchers at the University of Durham in the United Kingdom will be analyzing samples of the seals' DNA.

"For something that we never set out to find, the project really seems like something that will have some major results in the long term," says Hall. "Aside from the occasional sighting of an individual seal, no one had reason to believe that a group of elephant seals had been that far south because most of the evidence — tiny fragments of skin and tufts of hair — was so small. Once we knew it was there, the seals became a lot easier to find." ▮

In her laboratory, Brenda Hall, left, displays some of the remains she and her team discovered. While elephant seals and penguins remain the primary focus of the team's research, another perplexing discovery may soon bring a new marine animal into the mix. While searching for elephant seal skeletons, Brenda Hall's team discovered the mummified remains of 15 leopard seals grouped near the Ross Sea. Normally considered solitary hunters, the leopard seal grouping may prove to be even more perplexing than the elephant seal discovery.

NAVIGATIONAL

UMaine graduate students study acoustics in an effort to minimize whale injuries and deaths caused by ship strikes

By David Munson

THE CREW heard the impact and felt the ship shudder as it sailed along the Atlantic coast in early fall, but there's no such thing as slamming on the brakes when a 250-foot vessel is operating at cruising speed. As the ship gradually slowed to a stop, the crew spotted the source of the collision. Lodged on the bow was the broken body of a 25-ton right whale.

The 30-foot cetacean, one of perhaps 300 in the North Atlantic's critically endangered right whale population, had fallen victim to a phenomenon that policymakers, conservationists and scientists are struggling to control. That threat of ship strikes that looms large for many whale species has prompted two University of Maine graduate students to look for new ways to protect the world's largest mammals from the unforgiving hulls of commerce.

Kaitlyn Allen and Christie Mahaffey are conducting doctoral research in the university's unique ocean engineering program. By examining the acoustic signature of large ships, as well as whale biology and movement patterns, they hope to better understand the circumstances that can lead to ship-whale collisions and to develop new strategies to reduce the number of whale deaths and injuries.

"Because of the location of acoustic shielding and the overall design of the ships, most ships in the Bay of Fundy give off little or no sound for the first 10 meters depth and the first 500 meters in front of the ship," says Allen, who completed a two-year study in May with UMaine Professor of Mechanical Engineering Michael Peterson. "That's a pretty big blind spot as far as whales are concerned."

Allen and Peterson discovered that there are multiple factors that contribute to the number of whales killed or injured by ships each year, not the least of which is the likely misinterpretation of acoustic feedback by the whales themselves.

NOISE

WHALES NAVIGATE using sound, finding food and avoiding danger based on auditory information. Because most ships emit their loudest signal perpendicular to their line of travel, whales likely misinterpret the speed and direction of the motorized threat, vastly increasing the likelihood of collision.

"The acoustic signature of the ships may cause whales to actually swim in front of the ship because of a misinterpretation of the sounds," Allen says. ""Most of these ships are so big — over 120 meters long — they can push a whale all the way into port and the only thing they notice is that the engines are running a little slow."

Allen hopes to focus her research efforts on developing an inexpensive sensor that could be mounted on large ships. The device would be designed to detect whales and to emit a signal that would drive them toward safer waters. The project is a perfect fit for the ocean engineering program, allowing Allen to combine her interest in engineering with her knowledge of whale behavior.

"I did my undergraduate work in the UMaine School of Marine Sciences, and I switched to ocean engineering for my doctorate program because I wanted to both work with the data and create new technologies to help solve the problem," she says.

Mahaffey also was looking for interdisciplinary graduate study. After completing her master's degree in human ecology at the College of the Atlantic, she came to UMaine to expand her research that used GIS to look at the intersection of travel routes of whales and ships.

"We then used computer modeling to identify hot spots for ship strikes," Mahaffey says. "I'm particularly interested in looking at finback whales and how they use sound. Finbacks are one of the most common species to be struck by ships and no one knows why. By looking at both acoustics and behavior, I hope to be able to better understand how the whales are affected by human-generated noise."

Mahaffey will be working with Peterson and Sean Todd, director of Allied Whale at the College of the Atlantic, to examine how finback populations respond to ship sounds and sonar.

"I have always been interested in both the biological sciences and the physical sciences, and this is a great way for me to bridge the gap between those interests," says Mahaffey. "We need more opportunities for people to pursue different disciplines if we hope to find workable solutions."

RECOGNIZING THAT public education is a critical component of protecting whales and other marine creatures, Allen, Mahaffey and Peterson are working to implement an outreach program for students in Maine's public schools. They are collaborating with Becky Woodward, who received an interdisciplinary Ph.D. in mechanical engineering and marine sciences last March. Woodward's research compared swim performance in four species of baleen whales.

The ocean and mechanical engineers have secured seed money to develop hands-on and Web-based materials to help students of all ages learn more about whales. The researchers also hope to work directly with school groups to increase understanding of marine mammals and the many problems they face.

Mahaffey is already getting the word out to middle school students, teaching science and engineering 15 hours a week at the Indian Island School in Old Town, Maine, through a National Science Foundation fellowship in the GK–12 Sensors! program.

"Talking about ship strikes is a great way to bridge biology, physics, economics and policy in a real-world context," says Mahaffey. "We really hope to get students excited about protecting whales." ▮

Illustration and photo by Michael Mardosa

UMaine doctoral students Christie Mahaffey, left, and Kaitlyn Allen are conducting research to find new ways to protect whales from ship strikes.

"We know that (the aquatic fungus or chytrid) grows in the skin, causing it to thicken, and we suspect that it interferes with the movement of air and water through the skin, but no one is exactly sure how it kills the host. We know that it does not need an amphibian host to survive, but we have never seen it in a resting stage. There's still a lot that we just don't know."

Joyce Longcore

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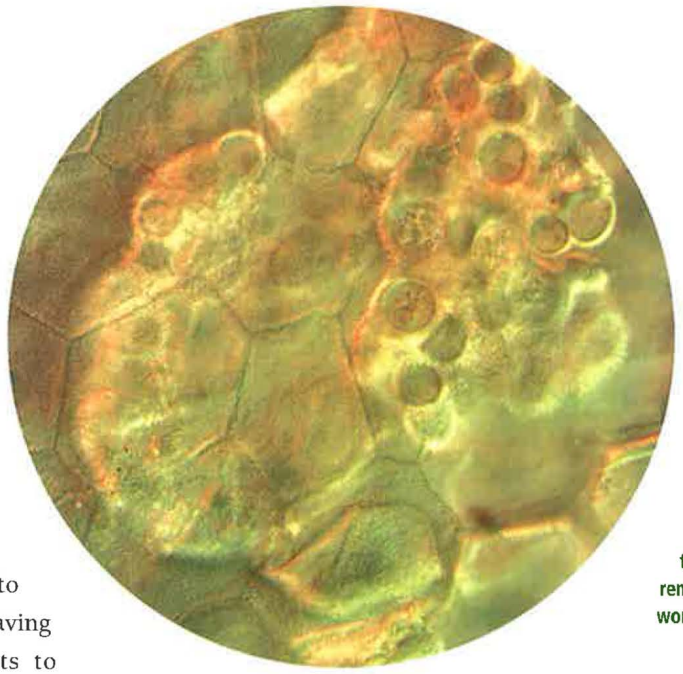
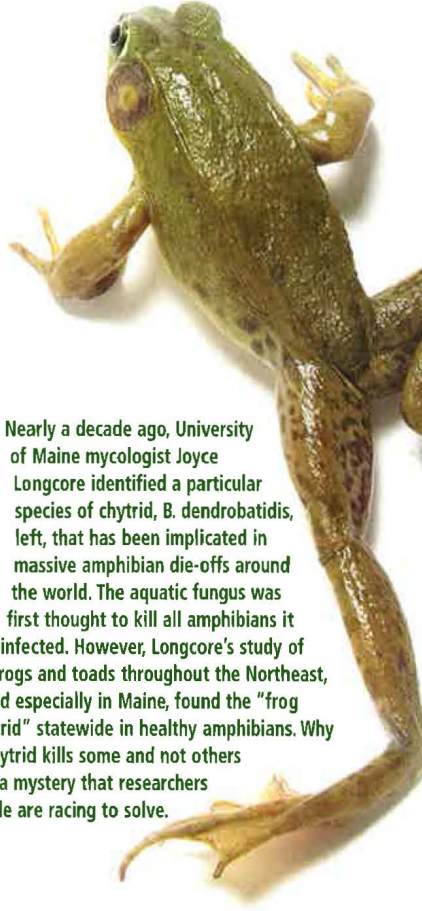
ycologist's research n the global race to amphibian die-offs

By David Munson





Nearly a decade ago, University of Maine mycologist Joyce Longcore identified a particular species of chytrid, B. dendrobatidis, left, that has been implicated in massive amphibian die-offs around the world. The aquatic fungus was first thought to kill all amphibians it infected. However, Longcore's study of frogs and toads throughout the Northeast, and especially in Maine, found the "frog chytrid" statewide in healthy amphibians. Why the chytrid kills some and not others remains a mystery that researchers worldwide are racing to solve.

FROM COOL, SWIRLING streams in California's High Sierra to foggy mountaintops in western Peru, frogs have begun to disappear, wiped out by a mysterious fungus that can cause entire populations — even entire species — to vanish.

The pandemic threat has helped to drive more than 100 species to extinction in the past 25 years, leaving researchers and conservationists to wonder how frogs can be saved.

Some of the answers may well be found in a refrigerator in a biological sciences laboratory at the University of Maine.

Dressed in faded jeans and a "Deep Hyphae" tee shirt, UMaine mycologist and associate research professor Joyce Longcore explained the fine points of fungal phylogeny with her good-natured and characteristically direct approach. A respected researcher in a highly specialized field, Longcore's techniques have become required reading for anyone wishing to study one of the world's deadliest fungi, Batrachochytrium dendrobatidis.

Patient and unassuming, Longcore has the dedication and experience to guide the operation of a tiny, two-room lab in Deering Hall, which could easily be described as command central for the global battle to stop the fungus that threatens the world's frogs.

Longcore has become one of the world's leading authorities on an unusual group of fungi casually known as the chytrids. That fact alone might have left her to work in relative anonymity outside of mycology circles, had it not been for the discovery of a particular species of chytrid, B. dendrobatidis, that has been implicated in massive amphibian die-offs around the world.

The first to isolate a pure culture of B. dendrobatidis nearly 10 years ago, Longcore has made numerous trips to remote locales to teach other researchers her methods for culturing the problematic pathogen. Her laboratory refrigerator has become the repository of numerous strains of the so-called "frog chytrid" from around the world.

"The chytrids are different from most other types of fungi. You have to use very particular methods to be successful because they just don't grow well in pure culture," says Longcore, pointing out a tiny white smear growing inside a test tube. "B. dendrobatidis is peculiarly adapted to amphibian skin."

THE AFFINITY OF the fungus for frog skin is key to its growing lethality. From California to Australia, entire populations of frogs, toads and other amphibians have been wiped out by the chytrid, leaving researchers scrambling to determine how it kills and, perhaps more importantly, how it spreads among populations.

edging extinction

Undergraduate research assistant Rebecca Steiger helps maintain chytrids in culture. Cultures from Joyce Longcore's lab at the University of Maine are used in research around the globe in an effort to stem amphibian die-offs and to better understand the role of aquatic fungi in the environment.

Longcore maintains more than 100 different strains of the frog fungus and distributes them to scientists for research projects ranging from small field studies to full-blown genome projects. Despite considerable attention in recent years, the enigmatic organism has led to more questions than answers.

"We know that it grows in the skin, causing it to thicken, and we suspect that it interferes with the movement of air and water through the skin, but no one is exactly sure how it kills the host. We know that it does not need an amphibian host to survive, but we have never seen it in a resting stage," says Longcore. "There's still a lot that we just don't know."

One of the most perplexing questions surrounding B. dendrobatidis infections has to do with the degree to which the pathogen affects the host. Working with her husband Jerry Longcore, a field biologist with the U.S. Geological Survey, now retired, Longcore determined that the same organism that had caused near 100 percent mortality in amphibian populations elsewhere was present in frogs throughout Maine, causing only a mild, sublethal infection.

"We looked at road-killed animals and were surprised to see frogs that had been healthy with the frog chytrid. Until then, we had always associated an infection with death," says Longcore. "We now know that most species of anuran amphibians in Maine are infected, but as far as we know there have been no die-offs attributed to the disease."

A frog's skin is important for respiration, as well as protection, which may be the reason B. dendrobatidis is so deadly. Joyce Longcore shows the delicate membrane found even between the toes of a green frog.

LONGCORE FIRST ISOLATED the deadly chytrid in 1997 in response to a die-off of exotic frogs in captivity. At that time, the Smithsonian National Zoological Park in Washington, D.C., was raising blue poison dart frogs. But during metamorphosis, the change from tadpole to frog, the amphibians native to South American rainforests were dying of unknown causes. The only clues were the spherical bodies inside their skin cells.

The search for answers led to Longcore.

"As soon as I saw the photographs, I knew (the culprit) was a chytrid," says Longcore. "I had spent the last 10 years isolating chytrids and growing them in pure culture. The blue poison dart frog was the first (amphibian) from which I isolated this particular chytrid, then we showed that it is capable of causing disease and death."

It turns out that around the same time, scientists in Australia found the organism decimating populations of frogs in the wild. In addition, a researcher doing frog surveys in Central America returned to the rainforest for a consecutive year to find the wilds eerily quiet, with frogs dead along the streams.

The big questions have to do with what the deaths mean environmentally and ecologically. Are frogs that are dying of chytrids harbingers of a yet unseen shift in the ecosystem, much like a canary in a coal mine? Or is this an invasive disease that has spread from a different continent?

Longcore is quick to point out that she is not a frog biologist. Her focus is on the fungi. Her current projects focus on the relationships between chytrid species and

their place among other fungi. She cooperatively published the first phylogeny of chytrid fungi in 2000, and she and colleagues are currently making use of recent advances in molecular classification methods to improve and expand on previous work. By determining how the strange and highly mobile chytrids are related, Longcore hopes to contribute to their reclassification and make it possible to study their role in the ecosystem.

CONSTANTLY LOOKING for ways to improve chytrid culture and identification techniques, Longcore has become an expert on the behavior of the fungi. As a result, one of her primary roles in many research programs by other scientists is to locate and identify chytrid species in soil and water samples. To do that, she goes "fishing."

Using tiny bits of shrimp chitin, onion skin, pollen and other baits, she attracts the zoospores of carbohydrate-and-protein-loving chytrids, growing them so they can then be isolated and identified. It's fishing on micrometer scale, and a prize catch means a pure culture of a chytrid for someone's research project.

"A big part of what we do is hunt for different chytrids in samples that are sent here," says Longcore "Right now, we have samples sent from mountain tops on three different continents. With the baiting technique, instead of looking for a needle in a haystack, we can draw the chytrids in."

Once the individual chytrids grow on the baits, Longcore and graduate student Rabern Simmons can begin the daunting task of culturing the uncooperative fungi. When working with the frog chytrid, they must maintain strict safety protocols to ensure that the cultures don't escape into the environment.

Joyce Longcore started isolating chytrids into pure culture in the mid-1980s. Now with more than 400 isolates, she has what is probably the most comprehensive collection of chytrids in the world. One hundred of the frog chytrids came from the U.S., Quebec, South Africa, Panama, Puerto Rico and Venezuela.

Graduate student Rabern Simmons' work in Longcore's lab focuses on the relationships between different species of chytrids. Microorganisms are much more diverse than scientists previously understood, he says. Using electron microscopy and DNA analyses, researchers often find that organisms once thought to be one species belonging to a larger group represent their own genus or even their own order.

Established cultures are kept in two refrigerators in Longcore's lab; back-up specimens are frozen in liquid nitrogen in case the active cultures fail. Establishing and rotating the ever-growing collection is time-consuming work, but there is certainly no shortage of researchers requiring samples and Longcore's expertise.

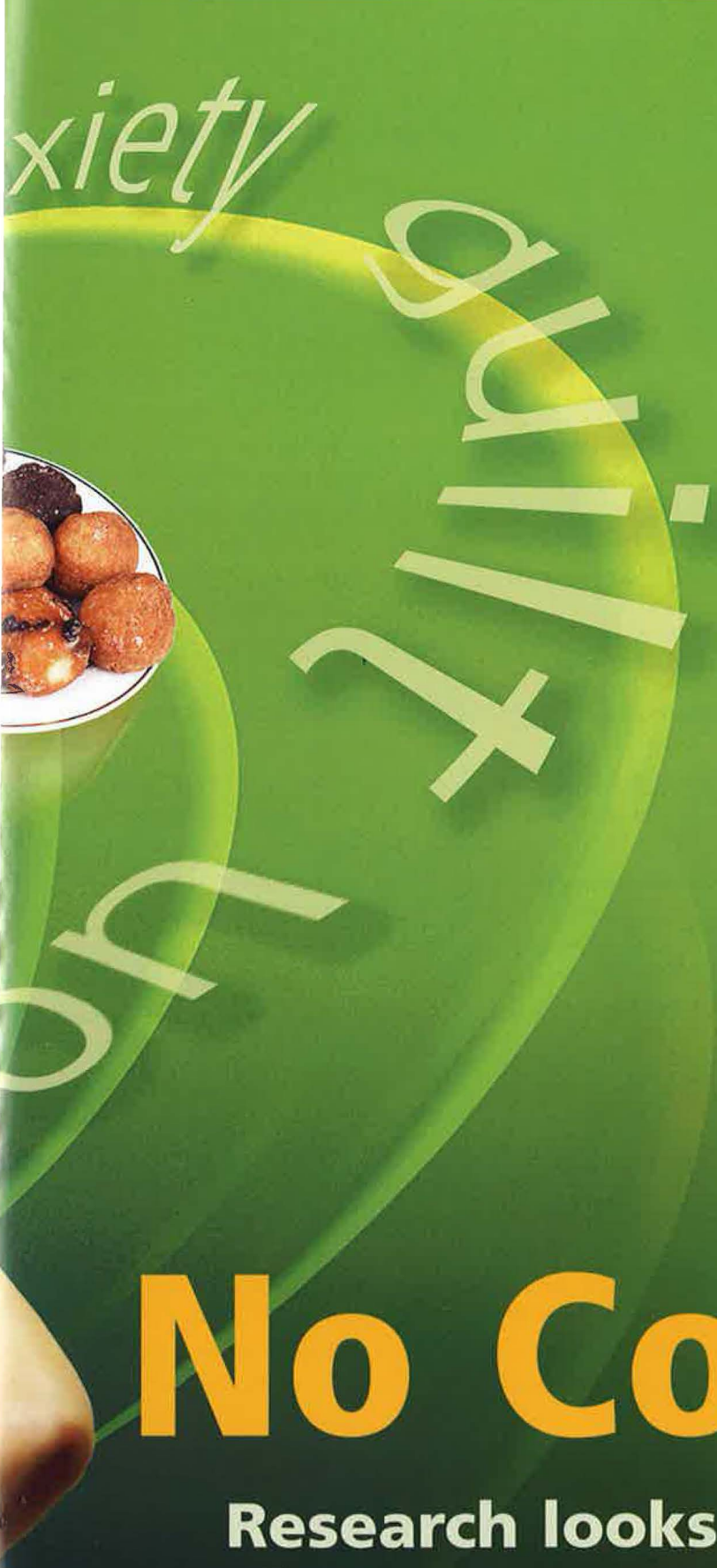
Recently, one of Longcore's cultures was used by researchers at Duke University to isolate high-quality DNA, which was sent to the Broad Institute, where scientists from MIT and Harvard University are sequencing the B. dendrobatidis genome.

Longcore's frog chytrid cultures also are being used by Cornell University researchers who are examining the role of repeats in the organism's genetic code, and by U.S. Fish and Wildlife Service technicians seeking to determine the risk of spreading the disease to new bodies of water through fish stocking programs.

"We have a lot of different strains and there are a lot of different projects. Some researchers will ask for one and some will ask for multiple strains from different areas," Longcore says as she checks some samples under the microscope.

"Right now we have isolates from Africa going out for a study in population genetics. Just yesterday we sent an isolate to Montana for some DNA research. It definitely keeps us busy." ▮


The Smooth Cola
stress



EVERYBODY HAS TO EAT. But Samantha had to eat seconds — and more.

In the depths of depression and anxiety, whenever she felt low or stressed, Samantha says she felt "an overwhelming need to find something to eat."

The binge eating cycle started when Samantha was a girl. Childhood taunts that she was fat quickly became a self-fulfilling prophesy. She began hiding food in her room. She ate until she was uncomfortable and she never purged. When it was all over, when she couldn't eat another bite, she felt guilty and ashamed. And the cycle started again.

Her mother didn't buy a lot of junk food, so Samantha got very creative. One of her favorite concoctions: melted Marshmallow Fluff and butter mixed with cereal. She would eat two or three bowls at a time. When she made cookies, she ate the batter and most of the baked batch, leaving just enough so her binge eating wouldn't be too obvious.

As the years went on, Samantha smoked a lot of pot to get the munchies — to "have an excuse to eat."

Now in her 30s, Samantha (who asked that her name be changed for this story) admits that it continues to be a constant battle to overcome the frequent urges to binge eat. Looking for answers and help, she volunteered to participate in studies being conducted by psychologists at the University of Maine to better understand binge eating disorder.

No Comfort

Research looks at the relationship between stress and binge eating

By Clinton Colmenares and Margaret Nagle

Photo illustration by Carol Nichols

"Parents often use food as a reward for children. When we are adults, food is a way to without a prescription." **Sandra Sigmon**

Samantha has received help from therapy and medication to stabilize depressive moods. Yet she still must consciously struggle with her inability to control her binge eating disorder, what she describes as a "gushing wound."

"I don't give up, either," she says. "Every day really is a new day."

ACCORDING TO THE National Institutes of Health, Samantha is one of 4 million Americans — 2 percent of all adults in the United States — who have binge eating disorder. One of the most common of the eating disorders, it is seen most in people who are overweight or obese, but normal-weight people also can have it.

In light of the sky-high rate of obesity in this country, the incidence of binge eating disorder is most likely underestimated, says UMaine clinical psychologist Sandra Sigmon. Not all people who are overweight are binge eaters, but Sigmon says as many as 50 percent could be.

In addition, binge eating was recognized as a disorder by the medical and psychological communities only in recent years. Researchers like those at the University of Maine are contributing to the literature one study at a time.

"In the past, I don't think people realized they had an eating disorder. But because of obesity rates, people are understanding that binging is more that just overeating and they can get help for it," says Sigmon, a professor of psychology. "Because of its health consequences, binge eating as a psychological disorder is now getting attention."

The National Institute of Mental Health describes binge eating disorder as a constellation of behaviors: eating excessively in a short time with the "sense of a lack of control over eating during the episode." People might eat faster than normal, eat until they're uncomfortably full, eat even when they're not hungry, eat alone out of shame and then feel disgusted for giving into the urge.

Unlike people with bulimia, who also feel the need to eat excessively, people with binge eating disorder do not purge.

Most people are diagnosed with binge eating disorder in their 20s and 30s, Sigmon says, often after seeking help for other health problems, such as depression or obesity. Left untreated, binge eating disorder can increase a person's risk of stroke, heart problems and diabetes.

"We have a complex relationship with food," says Sigmon. "It's a social thing. It's critical for survival. We can't just stop eating. We need food."

However, problems can arise when food takes on meanings other than sustenance, and chronic overeating results.

"This is something we probably learn in childhood and adolescence," she adds. "Parents often use food as a reward for children. When we are adults, food is a way to make ourselves feel better, without a prescription."

Symptoms of Binge Eating Disorder

- **Eating more than most people would in a similar period of time.**
- **Feeling out of control, unable to stop eating or to control how much or what is eaten.**
- **Eating more rapidly than normal.**
- **Eating until uncomfortable.**
- **Eating when not hungry.**
- **Eating alone out of embarrassment, disgust and guilt.**
- **Binging at least two days a week for six months that isn't followed by compensatory behavior, such as purging, fasting or excessive exercise.**

JUST WHAT CAUSES binge eating disorder remains a mystery. Scientists are studying the effects of brain chemicals, metabolism — even genetic disposition — on the disorder.

The National Eating Disorders Association (NEDA) says eating disorders "are most often about much more than food." Indeed, genetic links are more important than we previously thought, says Kari Augustyn, a NEDA program director. "There are a lot of family and life stressors that contribute," she says.

At UMaine, Sigmon and graduate student researchers are focusing on the relationship between stress and binge eating disorder. Sigmon's research focuses on women's physical and mental health. She studies seasonal affective disorder, which occurs four times more in women than men; and panic disorder, which is twice as likely in women. With a higher incidence of depression and anxiety in women, binge eating disorder also is a natural focus.

"In all three disorders, stress is a common denominator," she says.

Psychology Ph.D. student Stephanie LaMattina is studying the neuroendocrine response to physical and psychological stress, and its relationship to the urge to overeat. As part of her doctoral research, she is looking at cortisol levels before and after stress and episodes of binge eating. She is interested in the body's biological response to stress with the elevation of cortisol, a hormone

make ourselves feel better,

produced in the brain that helps regulate metabolism and blood pressure. The question to be answered is whether there is a physiological correlate between elevated levels of cortisol and binge eating, or whether it is a cognitive reaction — a perception of stress — that triggers an urge to eat.

LaMattina also will look at the types of stressors that can lead to changes in cortisol levels in the body and to perceptions that a person is experiencing stress.

Work by Barbara Hermann, also a Ph.D. student in psychology, focuses on cognitive awareness or "mindful eating" — consuming a few rather than all the potato chips, or making healthier choices.

BECAUSE FOOD IS so often revered as a compensation or a "comfort" in our society, binge eating disorder may begin very voluntarily. But over time, it can become involuntary, so that people automatically reach for food instead of seeking alternative stress relievers, like exercise. By that point, Sigmon says, binging has become a habitual process that's hard to break.

The key to treating binge eating disorder is in getting people to "think of themselves and food differently," Sigmon says. "They need to learn how to problem solve and address stressors in different ways besides overeating. They need to think of food as sustenance rather than a comfort or panacea."

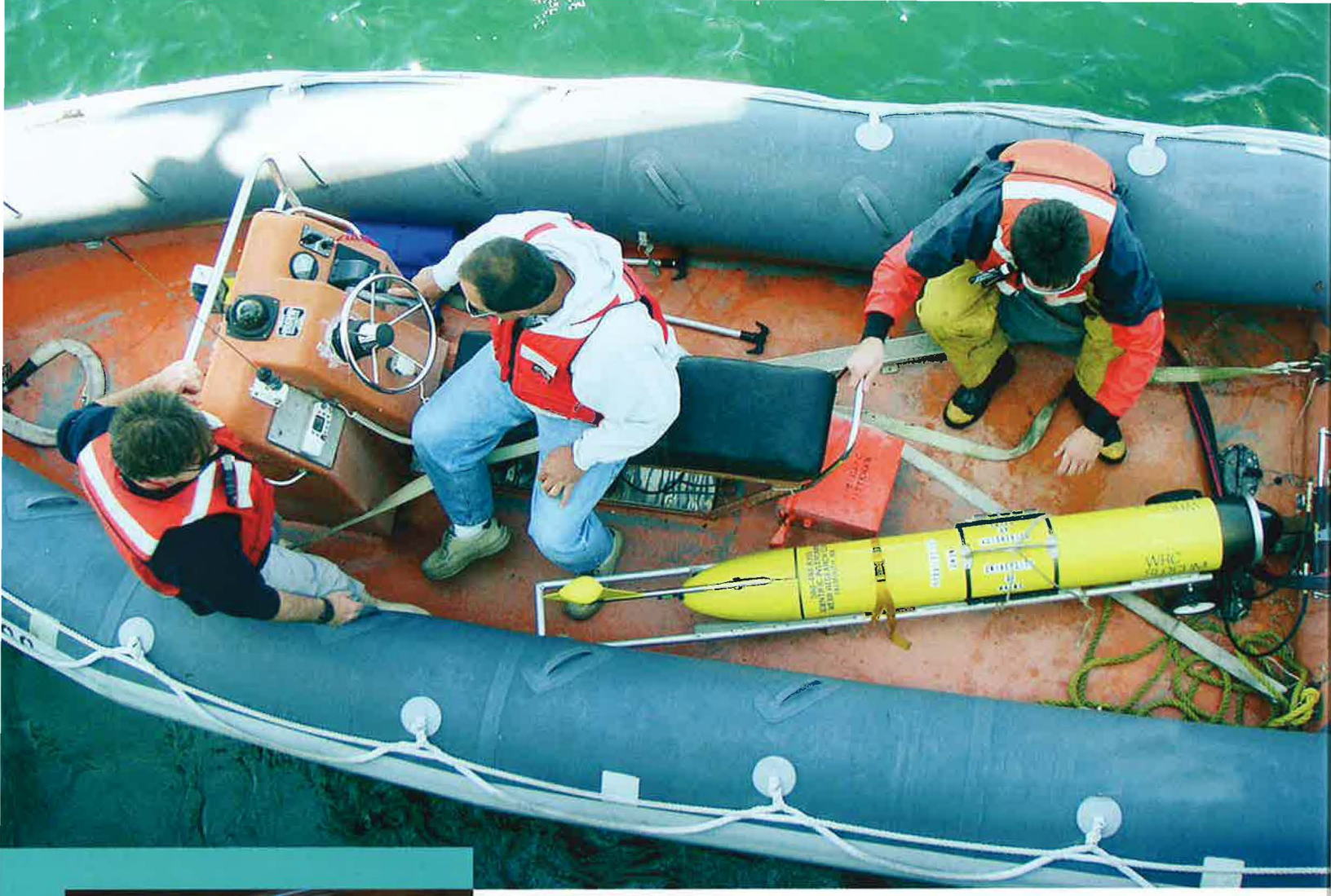
Ironically, a treatment program for binge eating often starts with a focus on mealtimes. "We teach people to eat three times a day, with two small snacks in between. Then the focus is on portion size and exercise to be healthy," says Sigmon. "It seems contradictory, but we need people to eat regularly. Sometimes people justify binging because they've not eaten all day, but that just sets up a vicious cycle. It's important to teach people how to eat so they don't get as many urges."

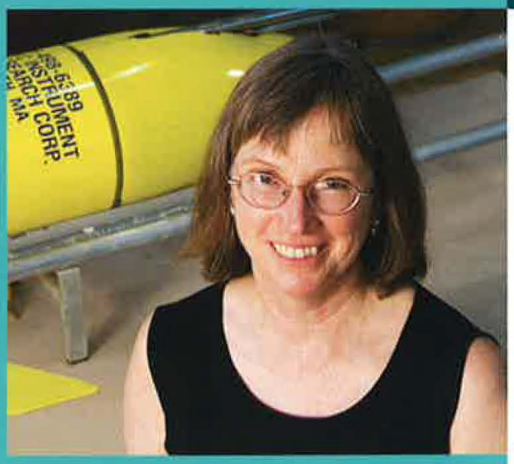
In one study, the UMaine researchers are exploring the effectiveness of alternative ways of delivering treatment for disorders like binge eating. In particular, they are looking at the feasibility of providing clients with self-help resources combined with limited therapist contact. Such alternatives are particularly pertinent in rural states like Maine, where frequent trips to a therapist can be prohibitive.

Treatment for binge eating disorder traditionally involves both cognitive and behavioral components. Sigmon wants to know if the two are equally effective as separate treatments. Using the cognitive approach, clients are urged to change the way they think about themselves and about food; with the behavior method, people focus on eating three times a day, problem solving and exercising.

"With more treatment options, we'll reach more people whom we were not able to reach before, helping them learn how to eat in a more healthy way," says Sigmon. ▮

The UMaine Department of Psychology has created a niche in educating and supplying one of the most rapidly growing subspecialties — medical psychology — integrating mind and emotional science with traditional healthcare to better understand people's behaviors and to help them through difficult treatment. If you would like more information about research being conducted on binge eating disorder, call 207-581-2034.





Mary Jane Perry, a professor of marine sciences and oceanography at the University of Maine's Darling Marine Center, is a pioneer in the use of autonomous underwater gliders for remote research. In June, she deployed the first such glider in the Gulf of Maine with the help of UMaine colleagues Neal Pettigrew and David Townsend. Rob Bell and the crew from the R/V *Cape Hatteras*, top photo, retrieve Nemo after its first mission.

Gliding *in the* Gulf

By David Munson

With its bright yellow wings, a battery of sensors and seemingly endless endurance, the latest technological tool being employed by marine researcher Mary Jane Perry is offering scientists a glimpse of the unknown as it slowly cruises the coast of Maine.

In June, the University of Maine's first glider of this kind was deployed into the chilly waters of the Gulf of Maine. Affectionately dubbed Nemo, the 6-foot, fluorescent yellow device promises to change the way we look at ocean ecosystems.

An autonomous underwater device named Nemo will provide ocean scientists with detailed deep-sea data

Autonomous gliders like Nemo represent a whole new way of carrying out ocean research. Looking like a cross between a torpedo and a manta ray, gliders are built for long-distance, low-energy travel. On its first voyage along the Maine coastal current, Nemo cruised along at just under 1 mile per hour, its multiple environmental sensors whirring away 24 hours a day, seven days a week. The glider's data-gathering marathon continued for two weeks — less than half of its monthlong excursion capability.

"One of the main advantages of gliders is their persistent presence in the ocean," said Perry, a professor of marine sciences and oceanography at UMaine's Darling Marine Center and a pioneer in the use of autonomous underwater gliders for remote research, speaking in a presentation to colleagues in July. "They give us the ability to gather data and observe features over time that might never be observed using satellites or other platforms. If you have to wait for a ship, you might entirely miss an important event."

The bright yellow autonomous underwater glider that can descend to great depths is doing for oceans what satellites have done for the heavens by providing unprecedented information about hard-to-reach environments.

NEMO'S ABILITY to operate for an entire month at a time is due in part to its unique method of movement. Using an internal piston that alternately draws in and expels seawater from a chamber in the rear of its tubular housing, Nemo changes its buoyancy by shifting the ratio of internal seawater to oil, which is stored in a bladder in the nose of the device. The buoyancy changes are translated into forward motion with the help of its wings.

Nemo's rhythmic rise and fall propels it, albeit slowly, through the water column. At set intervals, it rises to the surface, transmitting data back to the lab on such features as phytoplankton concentration and salinity. It maintains a predetermined course by checking its position via GPS or accepts new instructions from researchers working from a ship's cabin or mainland lab.

The 100-pound glider's sensors must be small and durable enough to operate effectively inside the device. Perry has been instrumental in facilitating the creation of glider-friendly sensors since she began working with the devices nearly 10 years ago at the University of Washington.

"Part of my contribution to get the program going came through cooperating with industry to create smaller sensors. Together, we were able to reduce optical sensors from the size of a football to the size of a hockey puck, which is a significant improvement when you consider the size and weight limitations on a glider," says Perry.

Nemo comes equipped with multiple optical sensors that capture both backscatter and fluorescence. Other sensors deliver a stream of data on water temperature, salinity and oxygen content. With the ability to glide along at depths of up to 200 meters, Nemo can gather and transmit a broad range of data that fixed sensors and satellites simply can't provide.

Perry's goal is to have two or more gliders operating in Maine waters, allowing researchers to maintain a constant stream of data by replacing the autonomous devices on a monthly basis. With funding from the Office of Naval Research and the UMaine Office of the Vice President for Research, Perry worked closely with School of Marine Sciences researchers Neal Pettigrew, David Townsend and Carol Janzen to acquire Nemo and initiate what they hope will become a long-term program of research utilizing multiple gliders.

PERRY IS USING the data gathered during Nemo's first foray into the Gulf of Maine to examine the relationship between salinity, dissolved organic matter and phytoplankton in the water column. She hopes to use the data to better understand how the distribution of plankton is affected by climate variability. However, the current project only hints at the level of scientific insight that Nemo and gliders like it could one day provide.

Perry envisions future data-gathering missions that will serve the needs of multiple researchers, contributing reliable information that can be used in conjunction with satellite imagery, fixed sensor arrays like the Gulf of Maine Ocean Observing System (GoMOOS) and other data platforms to create a more accurate picture of the forces at work beneath the waves.

"Each platform has its advantages and its biases. A combination of platforms is needed to give a true picture in a turbulent fluid like the ocean," says Perry. "For instance, a glider can see the subduction of plankton where a satellite can only see the surface. It can help to fill in the blanks by putting together a more four-dimensional picture in terms of space and time."

As interest in the data-gathering potential of gliders gains momentum, Perry hopes to develop a backbone of support for ongoing missions. She also plans to foster the educational potential of the device by using glider research missions as teaching and training opportunities for students.

"This is definitely the way oceanography is going," says Perry. "It's an incredible way to look at the ocean. Every time you look, you learn something new." ▮

Cultural experience

"By learning the glacial extent of the region, we're hoping to more clearly define what could have been coastal-to-highland interaction of (paleoindian) migration routes. We also looked at potential archaeological sites in the area for possible future excavation."

Louis Fortin

IN HIS SECOND SEMESTER at the University of Maine, Louis Fortin switched his major from computer science to anthropology to study history and cultures.

Three years later, the Monmouth, Maine, native was in southern Peru's Andes Mountains, assisting with research by one of the world's leading authorities on South America's earliest inhabitants and the influence of climate on their cultural development.

Fortin was a field assistant to the UMaine research team led by UMaine Professor of Anthropology and Quaternary Studies Daniel Sandweiss. Also on that summer 2004 expedition were undergraduate Benjamin Morris and graduate student Kurt Rademaker.

As part of an ongoing investigation, the archaeologists are studying prehistoric settlements to learn how the first inhabitants arrived and lived in South America. In particular, the researchers are looking for links between coastal and highland paleoindians.

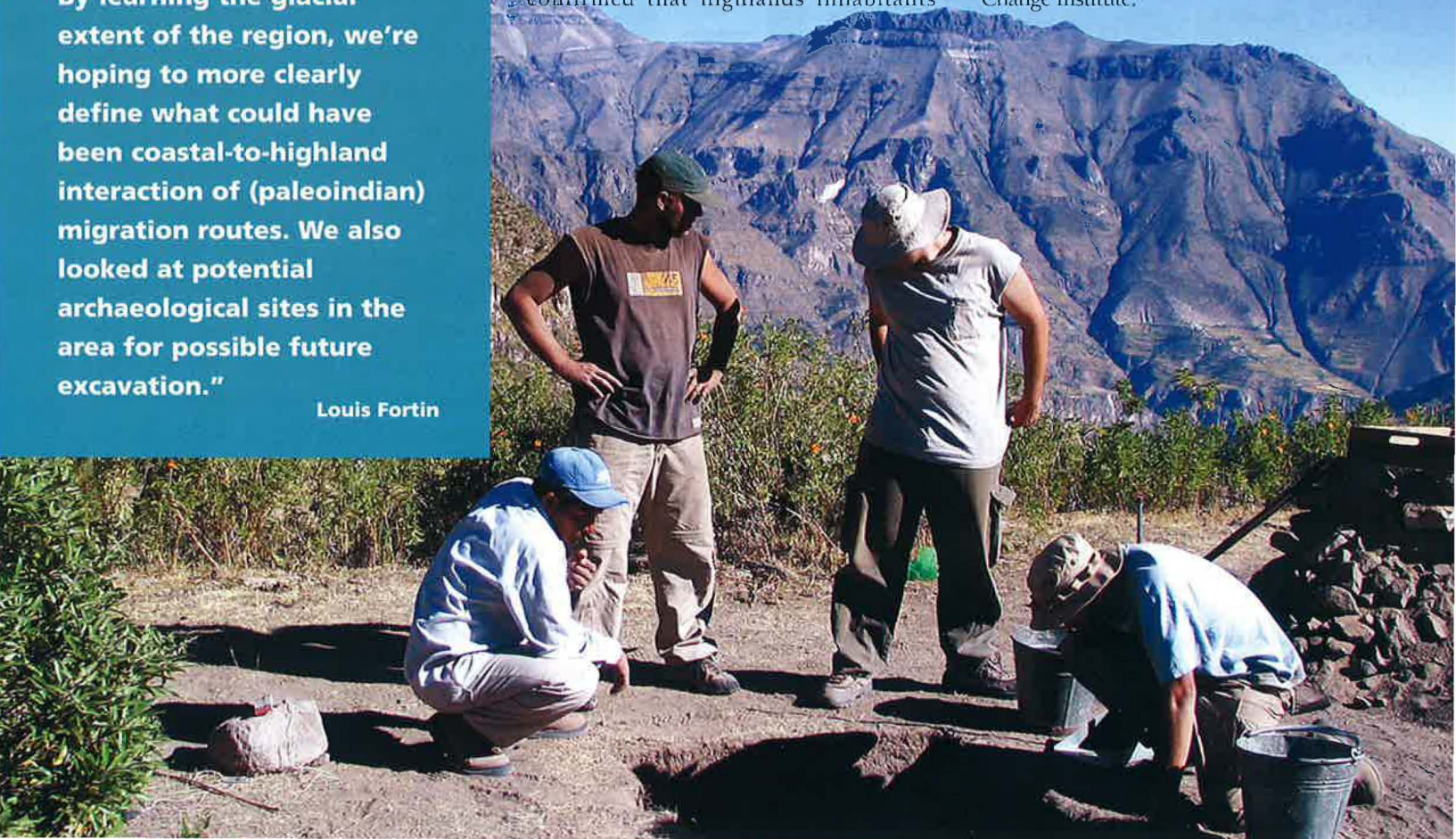
Among their findings at a 3,700-year-old excavation site near Alca were ground stone tools that still had traces of maize and vegetation from the Amazon. The discovery confirmed that highlands inhabitants consumed corn 1,000 years earlier than previously believed. It also opened the possibility of interaction between people of the Andes and the Amazon.

That first summer of fieldwork, Fortin learned about the history and culture of paleoindians and their descendants, including their use of obsidian, the volcanic glass made into weapons and tools.

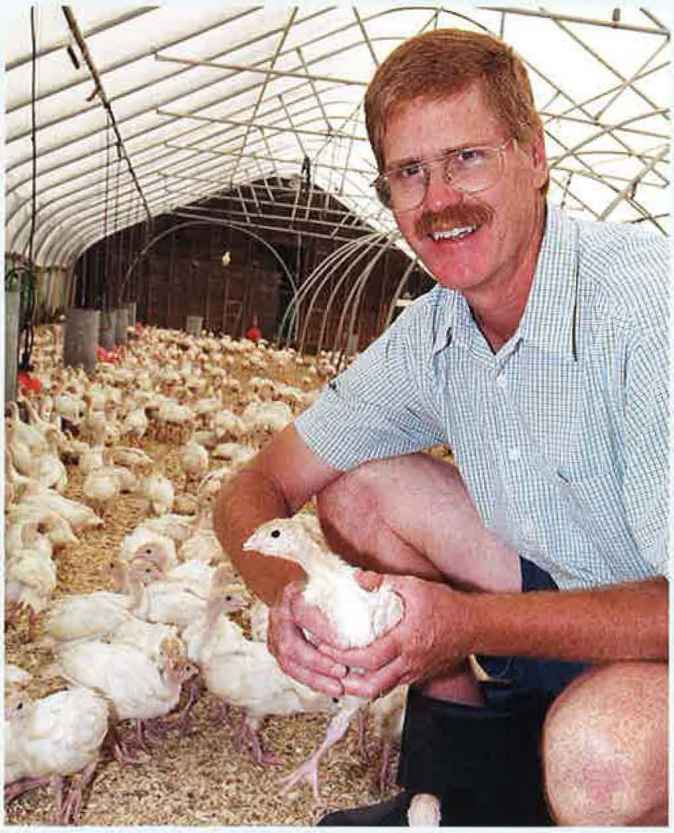
For the past two summers, Fortin worked in Peru with Rademaker and glacial geologist Gordon Bromley, both UMaine Ph.D. students in the Climate Change Institute, and Claire Todd of the University of Washington, doing field surveys of the glaciated volcanic mountains. Amid the glacial landforms of Peru's Nevado Firura and Nevado Coropuna, the team mapped archaeological sites, which are among the world's highest elevation paleoindian settlements.

Their research explores the relationships between climate and environmental change, and the early paleoindians settlement of South America at the end of the last ice age.

This fall, geoarchaeology is the focus of Fortin's graduate research in the Climate Change Institute.



avian flu awareness



Mark Hutchinson

Title: Associate Extension Professor, University of Maine Cooperative Extension
Research focus: Commercial agriculture and home horticulture in Knox, Lincoln and Kennebec counties, with ongoing studies in soil health and compost utilization
Years at UMaine: Six
Milestones: Recipient of the 2006 Achievement Award of the National Association of County Agricultural Agents

Question: What's most important for the public to know about the avian flu?

Answer: Avian influenza, often referred to as bird flu, is an infection-caused virus. There are two types of avian influenza strains — low pathogenic and highly pathogenic. The current concern is the highly pathogenic Influenza A H5N1 virus, also called H5N1 virus. The virus subtype occurs mainly in birds, and is highly contagious and can be deadly to them. The H5N1 virus does not usually infect people. However, infections with these viruses have occurred in humans, most from direct or close contact with H5N1-infected poultry or H5N1-contaminated surfaces. Low pathogenic avian influenza occurs naturally among birds. The H5N1virus is not currently in the United States.

Question: What's the biggest misconception about avian flu?

Answer: One misconception is that avian influenza is the same as pandemic flu. They are not the same. Avian (or bird) flu is caused by influenza viruses that occur naturally among wild birds. The highly pathogenic H5N1 variant is deadly to wild and domestic fowl. Pandemic flu is virulent human flu that causes a global outbreak, or pandemic, of serious illness. Because there is little natural immunity, the disease can spread easily from person to person. Currently, there is no pandemic flu. The H5N1 virus does not infect humans easily, and if a person is infected, it is very difficult for the virus to spread to another person. All influenza viruses have the ability to change. That's why scientists are concerned that H5N1 virus one day could infect humans and spread easily from one person to another. This may then cause a pandemic.

Question: What's the primary message to small flock owners in Maine?

Answer: Small flock owners in Maine should implement and maintain appropriate biosecurity practices with their flocks to reduce the risk of infection. Proper biosecurity measures, including facility sanitation and flock health inspections, can be found on the Web (www.personal.psu.edu/gpm10/Biosecurity-fun402.pdf).

Question: How can people remain confident that the poultry they eat is not contaminated?

Answer: Avian influenza is not transmitted through properly cooked food. To date, no evidence indicates that anyone has become infected following the consumption of properly cooked poultry or poultry products. If poultry products are cooked to safe temperatures, the virus will be destroyed. Cook poultry and egg products to at least 165°F (or 74°C) to ensure that the food is safe to eat. Keep in mind that refrigeration and freezing do not kill the virus.

Top Taste Treat

BLUEBERRY YOGURT COVERED in dark chocolate was the winning combination for the University of Maine at the Institute of Food Technologists Student Association's 2006 Product Development Competition.

YoBon Berry Bites, fruity frozen bonbons created by a student product development team — Jennifer Jordan, James Perry, Jason Bolton, Shari Baxter and Kristi Crowe — took first place. The competition included products from 23 of the nation's top food science programs.

UMaine food scientist Denise Skonberg is the team's adviser.

UPDATE

Since the competition, three team members graduated and are pursuing careers in food science. The remaining two — Baxter and Bolton, both graduate students in food science — hope to take YoBons to the next level.

The pair has applied for a grant from the Maine Technology Institute for funding to support further market research. They also want to develop specialized equipment in the UMaine Department of Food Science and Human Nutrition's pilot plant to manufacture the frozen confection in quantity.

Baxter and Bolton will continue to create the bonbons in small batches for further trials.

YoBons are packed with antioxidants and bone-building calcium. They also represent a potential new market for one of Maine's signature crops: the wild blueberry.

Marketing for the new product is aimed at women, offering them both the healthful effects of anthocyanins from blueberries and antioxidants from dark chocolate. The treat also is fortified with calcium and vitamin D to counter the effects of bone loss.

Roads that last longer

MAINE COULD SAVE up to $400,000 per mile of paved highway by increasing the permeability and improving the gradation of its roadbeds, according to two University of Maine civil engineers.

Moreover, a more permeable base would increase the life of the road, forestalling the need for a pavement overlay for 10–15 years.

On-site and in the laboratory, graduate student Michel Bouchedid and professor Dana Humphrey, working in cooperation with the Maine Department of Transportation, analyzed the permeability and gradation of subbase material on eight primary and secondary state highways, each between 8 and 12 years old. They found that improved drainage and reduced frost action resulting from permeable roadbeds could almost triple the life of highway pavements.

Their research findings were published in the *Journal of the Transportation Research Board.*

Lost and Found

A BOTTOM-DWELLING fish listed as endangered since 1967 has been rediscovered in the Penobscot River in Maine by University of Maine researchers — the first confirmed encounter of shortnose sturgeon there in 28 years.

The 11 fish captured were up to 42 inches long and of breeding age. Five were implanted with transmitters so researchers can follow their movements.

The rediscovery of the species is an important milestone in an ongoing project on the abundance and habitat of sturgeon populations in the Penobscot system. The research is being conducted by UMaine Assistant Professor of Biological Sciences Michael Kinnison, graduate student Stephen Fernandes and USGS Cooperative Fish and Wildlife Research Unit scientists, with National Oceanic and Atmospheric Administration funding.

In the last century, much of the sturgeon's habitat was lost, and water quality problems persisted. The presence of a surviving population suggests that the Penobscot may be on the mend. The captures also point to the potential of the Penobscot River Restoration Project, which may aid struggling species.

Creativity Sparks Job Growth

NEW ECONOMIC DATA from the University of Maine give hope to cities across the country trying to gain a foothold in the creative economy. The data show that cities don't need a strong initial presence in the creative economy to have job growth in later periods, says Todd Gabe, associate professor of resource economics and policy at the University of Maine.

Todd Gabe's study, published in the academic journal *Growth and Change*, offers a look into trends of dispersion in the creative economy. In subsequent research, he hopes to gain a better understanding of the local factors that foster creative economy growth.

In his analysis of census data on 200 U.S. metropolitan areas, Gabe found that the Rocky Mountain, Southeast and Southwest regions had the largest growth of creative talent between 1990 and 2000. However, U.S. employment statistics between 1999 and 2003 show that many cities in those regions saw the slowest growth of jobs in creative sectors.

The New England region did not top the list in terms of growth in the number of people with creative skills during the 1990s, yet it experienced the highest rate of creative economy job growth between 1999 and 2003.

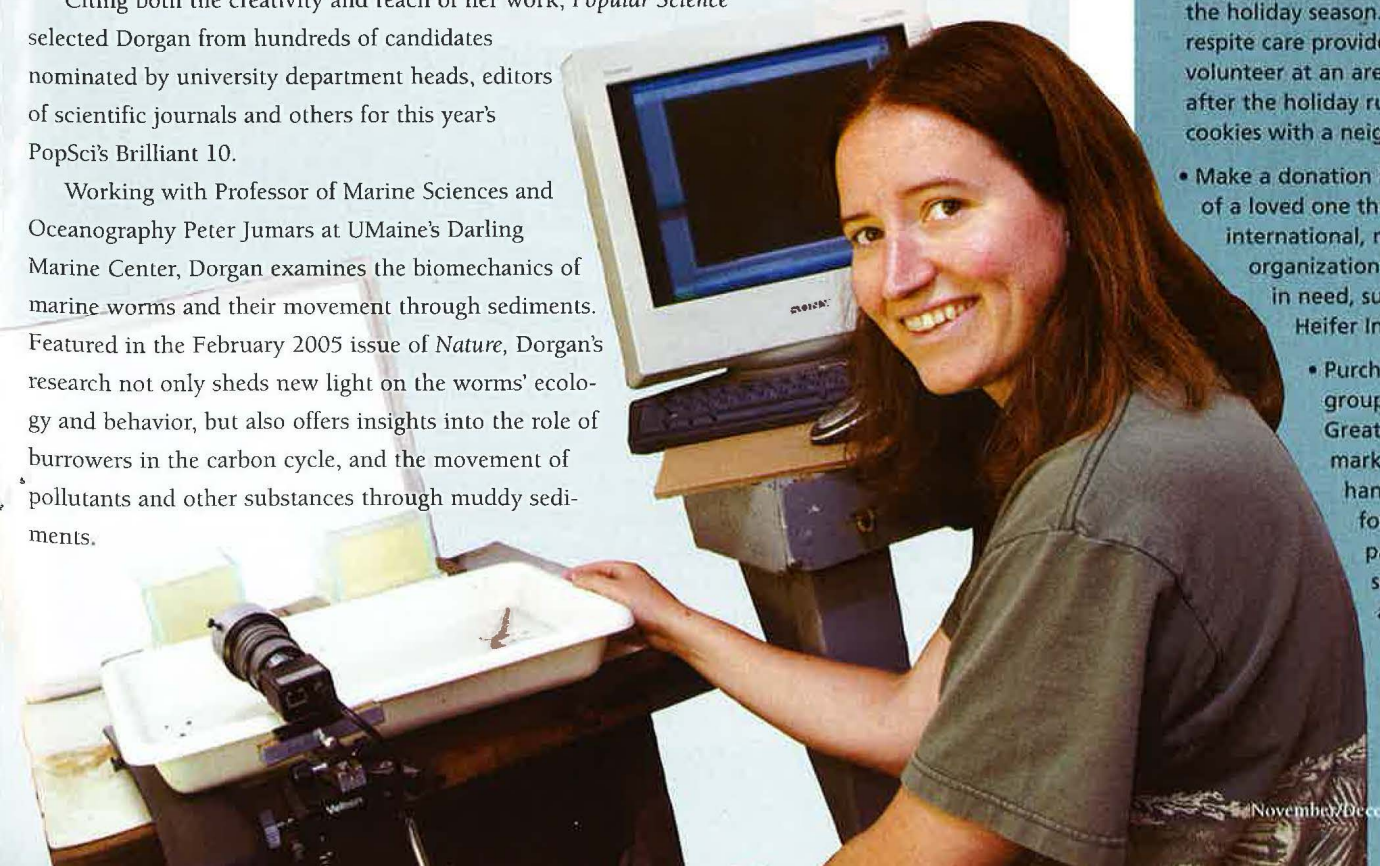
Creative occupations include those in engineering, education, science, the creative arts and entertainment.

One of PopSci's **Brilliant 10**

***POPULAR SCIENCE* MAGAZINE** has tapped University of Maine Ph.D. oceanography student Kelly Dorgan in its fifth annual search for the top 10 young researchers who are emerging as leaders in their respective fields.

Citing both the creativity and reach of her work, *Popular Science* selected Dorgan from hundreds of candidates nominated by university department heads, editors of scientific journals and others for this year's PopSci's Brilliant 10.

Working with Professor of Marine Sciences and Oceanography Peter Jumars at UMaine's Darling Marine Center, Dorgan examines the biomechanics of marine worms and their movement through sediments. Featured in the February 2005 issue of *Nature*, Dorgan's research not only sheds new light on the worms' ecology and behavior, but also offers insights into the role of burrowers in the carbon cycle, and the movement of pollutants and other substances through muddy sediments.



Insightlite

Gifts

'Tis the season for giving and two of the greatest gifts are time spent helping others and material donations that improve quality of life. Lyn Dexter, assistant director of the Office of Student Employment and Volunteer Services at the University of Maine, offers some suggestions for giving to those in need:

- Don't forget older children and teens. They're hardest hit by the holidays, because most donations of toys and clothing are for youngsters under age 11.
- Remember that gift cards can help parents or teens select what's needed — and wanted — most.
- Keep the needs of an entire family in mind by buying gift cards for the purchase of groceries, electricity, heating oil and gasoline.
- When giving of your time, think outside the immediate needs of the holiday season. Relieve a respite care provider for a day, volunteer at an area soup kitchen after the holiday rush, bake cookies with a neighbor's child.
- Make a donation in the name of a loved one through an international, nonprofit organization helping those in need, such as Oxfam or Heifer International.
- Purchase goods from groups like A Greater Gift, which markets fair trade handicrafts and foods in partnership with small-scale artisans and farmers worldwide.

Grain research

to help organic dairy farms

ORGANIC MILK PRODUCTION is one of the fastest-growing agricultural sectors in the Northeast, where there are more than 160 organic dairies.

To assist the farmers, the Maine Technology Institute (MTI) and U.S. Department of Agriculture have funded two research projects at the University of Maine focused on organic grain production. Organic grain concentrates currently cost New England's organic dairies nearly three times as much as nonorganic grains.

A $78,000 MTI cluster enhancement award, matched by an $827,000 USDA coinvestment, was made to UMaine Cooperative Extension, in collaboration with Maine Organic Milk Producers. The funds are being used to purchase equipment for testing different combinations of feed for organic dairy cattle.

The tests will enable farmers to identify the best combination that yields the greatest value in milk, while reducing the amount of high-cost imported organic grains. Testing will be conducted at the university's Witter Teaching and Research Farm, and on organic dairy farms.

In addition, Extension researcher Rick Kersbergen is leading a USDA-funded project to expand grain production and use on organic dairies in Maine and Vermont. A goal is to reduce dependence on grain from the Midwest and Canada.

Rediscovering conservation's early roots

A TRADITIONAL EXPLORATION of the history of American forest conservation often begins with the philosophies and accomplishments of 19th-century literary, artistic and environmental giants like Henry David Thoreau, George Catlin, Gifford Pinot and John Muir. But such a narrow view ignores the fertile foundation established by naturalists decades earlier, according to University of Maine environmental historian Richard Judd.

In "A 'Wonderfull Order and Ballance': Natural History and the Beginnings of Forest Conservation in America, 1730–1830," published earlier this year in the journal *Environmental History*, Judd traces the origins of environmental thinking among a group of scientists who studied American natural history while exploring the transappalachian frontier.

Rediscovering the early naturalists is key to better understanding the major precepts of conservationist thought in American environmental history — balance, interrelatedness, and the practical and spiritual importance of nature. Indeed, Judd says, concerns first voiced by early 19th-century environmentalists echoed to the end of the century.

Their histories document the epic of building a comprehensive natural history through first-hand observation. These naturalists also witnessed one of the greatest environmental transformations in American history, as vast tracts of the eastern forest gave way to a landscape of fields, meadows and pastures.

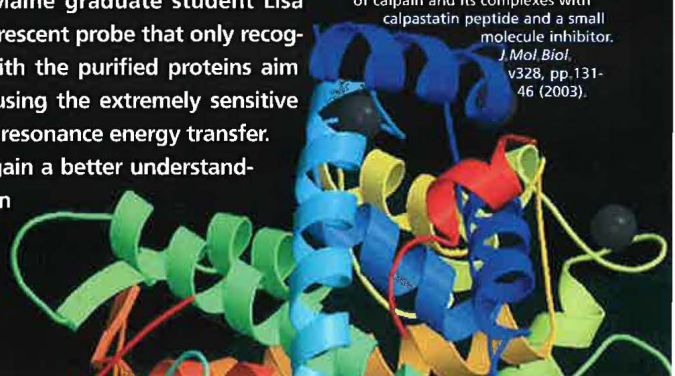
"It was this last point — the anxieties they expressed about America's forests — that provided a foundation for the conservationist ideas that took shape in the second half of the 19th century," says Judd.

Understanding the critical role of calpains

FOR MORE THAN two decades, University of Maine Professor of Biochemistry Dorothy Croall has studied calpains, a family of enzymes thought to contribute to basic cellular functions, as well as to the pathology of cancer and several neurodegenerative and muscle diseases. Calpains also play a critical role in the embryonic development of vertebrates.

Now a new project, funded by the National Institute of Neurological Disorders and Stroke, aims to develop a specialized biosensor to detect when and where calpains are active in cells or embryos. Croall and UMaine graduate student Lisa Vanhooser have generated a fluorescent probe that only recognizes active enzymes. Studies with the purified proteins aim to optimize the sensor's design using the extremely sensitive technique known as fluorescence resonance energy transfer.

If successful, scientists could gain a better understanding of the role of calpains in embryogenesis and disease.



The ribbons represent the structure of part of calpain and a bound peptide (in red) that provided key information for devising a probe to detect the active calpain enzyme.

Image courtesy of RCSB PDB; PDB ID: 1NX0, Todd, B., Moore, D., Deivanayagam, C.C.S., Lin, G.-D., Chattopadhyay, D., Maki, M., Wang, K.K.W., Narayana, S.V.L. "A structural model for the inhibition of calpain by calpastatin: Crystal structures of the native domain VI of calpain and its complexes with calpastatin peptide and a small molecule inhibitor. *J. Mol. Biol.*, v328, pp.131-46 (2003).

last impression

THIS PAST SUMMER, University of Maine Earth science students Elizabet Metcalfe, above, and Laura Brothers kayaked along miles of quiet coves and windswept peninsulas to get the best view of the Maine coast. But this was no leisurely sightseeing trek. Working with UMaine marine geologist Joseph Kelley, the students — Metcalfe, Brothers and Peter Leach — mapped fragile bluffs and gathered related data in an effort to help preserve Maine's famous coastline.

While many associate the state's seascape with scattered boulders and craggy outcroppings, Maine's soft coast of sand, gravel and other loose substrates is eroding rapidly. In fact, development pressures threaten the very existence of the state's picturesque and ecologically important bluffs.

The students' data gathering is funded by the Federal Emergency Management Agency. Their geological findings are being compiled in the Maine Geological Survey's online database as part of the Maine Natural Resources Protection Act. By the end of the research project next year, students will have mapped the nearly 3,500-mile tidal shoreline.

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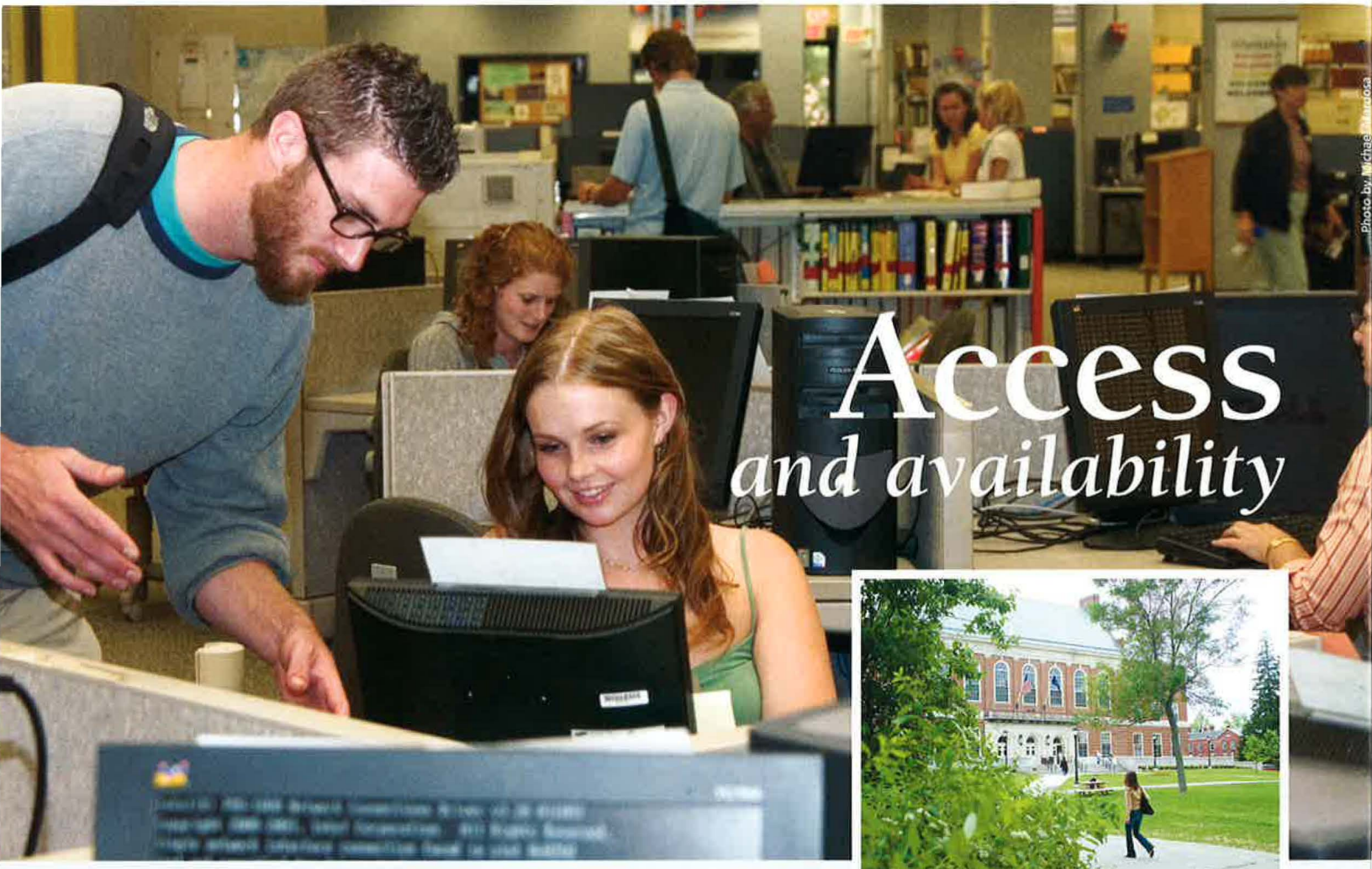

Access and availability

Photo by Bill Drake

RAYMOND H. FOGLER LIBRARY at the University of Maine is the largest research library in the state. The library's collections consist of more than 1 million volumes, 1.6 million microforms and 2.25 million government publications. These traditional formats are being integrated with many new collection materials, including sound recordings, CD-Roms, videotape and remote electronic resources.

In addition to serving the University of Maine community, Fogler Library spends thousands of dollars each year to support services and resources for the people of Maine. Recent projects include the Science, Technology and Business portal; Maine Music Box, an interactive, multimedia digital music library; and Windows on Maine, a collection of digital resources for teachers and students. Only a fraction of the cost to create and maintain these services is met by state funding.

A donation to the **Fogler Library Friends Quasi-Endowment Fund** in the **University of Maine Foundation** is a way to ensure that these resources remain free and available throughout the state.

Friends of Fogler Library is a group dedicated to helping carry on a proud tradition of providing private support to augment public funding. Its role is more important than ever as Fogler Library strives to maintain its leadership position in teaching, research and public service in a changing world.

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